

WHAT IS CLAIMED IS:

1. A highly-viscous-fluid applying apparatus comprising:

a fluid supply device operable to supply a highly viscous fluid;

a delivery nozzle from which the highly viscous fluid is delivered;

a pump disposed between said fluid supply device and said delivery nozzle, and operable to feed the highly viscous fluid received from the fluid supply device, to said delivery nozzle;

and a pump control device operable to control said pump, for controlling an amount of delivery of said highly viscous fluid to be delivered from said delivery nozzle.

2. A highly-viscous-fluid applying apparatus according to claim 1, wherein said pump is a screw pump including a pump housing having a screw chamber having a circular shape in transverse cross section, said screw pump further including a screw which is substantially fluid-tightly and disposed within said pump housing such that said screw and said pump housing are rotatable relative to each other, said pump control device including a pump drive device operable to rotate said pump housing and said screw relative to each other.

3. A highly-viscous-fluid applying apparatus according to claim 2, wherein said pump housing is stationary,

while said screw is rotated within said pump housing, by said pump drive device.

4. A highly-viscous-fluid applying apparatus according to claim 2, wherein said screw is stationary, while said pump housing is rotated about said screw, by said pump drive device.

5. A highly-viscous-fluid applying apparatus according to claim 2, wherein said delivery nozzle extends from one end of said screw pump, coaxially with said screw pump.

6. A highly-viscous-fluid applying apparatus according to claim 1, wherein said fluid supply device is a fluid supply device of a pressurizing type arranged to pressurize the highly viscous fluid and feed the pressurized highly viscous fluid to said pump.

7. A highly-viscous-fluid applying apparatus according to claim 6, wherein said fluid supply device of the pressurizing type includes:

a container accommodating a mass of the highly viscous fluid;

a compressed-air supply device operable to introduce a compressed air into an upper air chamber in said container; and

a supply passage connecting a lower end of said container and a first end portion of said screw pump opposite to a second

end portion of said screw pump from which said delivery nozzle extends.

8. A highly-viscous-fluid applying apparatus according to claim 2, further comprising:

a screw rotating device including a rotary shaft for rotating said screw of said screw pump;

a sealing device interposed between said rotary shaft and said pump housing, to maintain fluid tightness therebetween while allowing rotation of said rotary shaft.

9. A highly-viscous-fluid applying apparatus according to claim 4, wherein said fluid supply device includes a container for accommodating a mass of the highly viscous fluid, said container including a supply portion having an opening from which the highly viscous fluid is supplied, and said screw is fixed to said supply portion of said container.

10. A highly-viscous-fluid applying apparatus according to claim 9, wherein said supply portion of said container consists of a cylindrical portion extending from one end a body of said container, and said screw is fixedly fitted at a proximal end thereof in a first part of said cylindrical portion, said opening being formed through a second part of said cylindrical portion which is located nearer to said body than said first part.

11. A highly-viscous-fluid applying apparatus according to claim 9, further comprising a machine frame, and wherein said pump housing is held by the machine frame such that said pump housing is rotatable and is not axially movable relative to said machine frame, and said container is removably mounted on said machine frame such that said screw is fitted into said pump housing when said container is mounted on the machine frame, and is removed from the pump housing when the container is removed from the machine frame.

12. A highly-viscous-fluid applying apparatus according to claim 9, further comprising a machine frame and a nozzle holding member mounted on the machine frame, and wherein said deliver nozzle is rotatably held by said nozzle holding member.

13. A highly-viscous-fluid applying apparatus according to claim 9, further comprising a machine frame, and wherein said pump housing and said delivery nozzle are rotatably held by the machine frame, and said pump housing is rotatably fitted in said delivery nozzle.

14. A highly-viscous-fluid applying apparatus according to claim 12, further comprising a nozzle rotating device operable to rotate said delivery nozzle relative to said container and said machine frame.

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15. A highly-viscous-fluid applying apparatus according to claim 1, further comprising a delivery-amount detecting device operable to detect an amount of delivery of the highly viscous fluid from said delivery nozzle onto an object, and said pump control device controls said pump such that the amount of delivery of the highly viscous fluid detected by said delivery-amount detecting device is adjusted to a desired value.

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16. A highly-viscous-fluid applying apparatus according to claim 1, further comprising a gap-defining portion which is disposed so as to extend in a direction of extension of the delivery nozzle, in the vicinity of the delivery nozzle as seen in a direction perpendicular to said direction of extension, such that a free end of said gap-defining portion is located ahead of a free end of the delivery nozzle in said direction of extension and such that said gap-defining portion is moved with the delivery nozzle in said direction of extension, for abutting contact with a working surface of an object, to maintain a predetermined gap between said free end of said gap-defining portion and said working surface.

17. A highly-viscous-fluid applying apparatus according to claim 16, further comprising a machine frame, a biasing device and a stopper device, and wherein at least said delivery nozzle and said gap-defining portion are movable relative to said machine frame in an axial direction of

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said delivery nozzle, and are biased by said biasing device in said axial direction from a proximal end toward a delivery end of said delivery nozzle, said gap-defining portion and said delivery nozzle being normally held under a biasing action of said biasing device, at respective positions which are determined by said stopper device.

18. A highly-viscous-fluid applying apparatus according to claim 17, wherein said pump includes a pump housing, and said pump housing and said delivery nozzle are not movable relative to each other and are movable together relative to said machine frame in said axial direction.

19. A highly-viscous-fluid applying apparatus according to claim 1, further comprising a temperature control device operable to control a temperature of a mass of the highly viscous fluid, at least at a portion of the mass which is moved through said delivery nozzle for delivery thereof onto an object.

20. A highly-viscous-fluid applying apparatus according to claim 19, wherein said pump includes a pump housing and a screw disposed within said pump housing such that said screw and said pump housing are rotatable relative to each other, and said temperature control device has:

a gas passage through which a gas is circulated for heat transfer between said gap and a portion of said pump housing

which surrounds said screw; and

a gas-temperature control device operable to control a temperature of said gas is circulated through said gas passage.

21. A highly-viscous-fluid applying apparatus according to claim 1, wherein said delivery nozzle has a plurality of delivery tubes parallel to each other.

22. A highly-viscous-fluid applying apparatus according to claim 21, further comprising a nozzle rotating device operable to rotate said delivery nozzle about an axis thereof which is parallel to said plurality of delivery tubes.

23. A highly-viscous-fluid applying apparatus according to claim 22, further comprising a controller operable to control said nozzle rotating device according to a predetermined control program.

24. A highly-viscous-fluid applying apparatus according to claim 1, further comprising a support member, and a relative-movement device operable to move said support member and an object relative to each other in a direction parallel to a working surface of said object on which the highly viscous fluid is delivered from said delivery nozzle, and in a direction perpendicular to said working surface.

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apparatus according to claim 1, wherein said fluid supply device is a fluid supply device of a pressurizing type arranged to pressurize the highly viscous fluid and feed the pressurized highly viscous fluid to said pump, said apparatus further comprising a synchronous controller operable to operate said fluid supply device of the pressurizing type, in synchronization with an operation of said pump under the control of said pump control device.

26. A highly-viscous-fluid applying apparatus according to claim 1, wherein said pump control device includes a reverse-operating portion operable to operate said pump by a predetermined amount in a reverse direction opposite to a forward direction after termination of an operation of said pump in said forward direction to feed the highly viscous fluid to said delivery nozzle.